Status of AIRS Data at Met Office

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- Data monitoring
- Cloud detection
- Bias tuning
- Data assimilation plans

Met Office

Data monitoring

- **BUFR radiance data are compared with 6hr forecast fields from the Met Office global model**
- **Results from these comparisons are placed on our monitoring pages (password protected)**
- **Plots updated at 8Z each day**
- **Maps of O-B for all 324 channels for clear fovs**
- **Selected spectra and O-B spectra**
- **The plots show time series of past 3 months**
  - **% rejections from 1DVar q/c checks**
  - **Observed-Background mean and st. dev.**

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AIRS Monitoring Plots

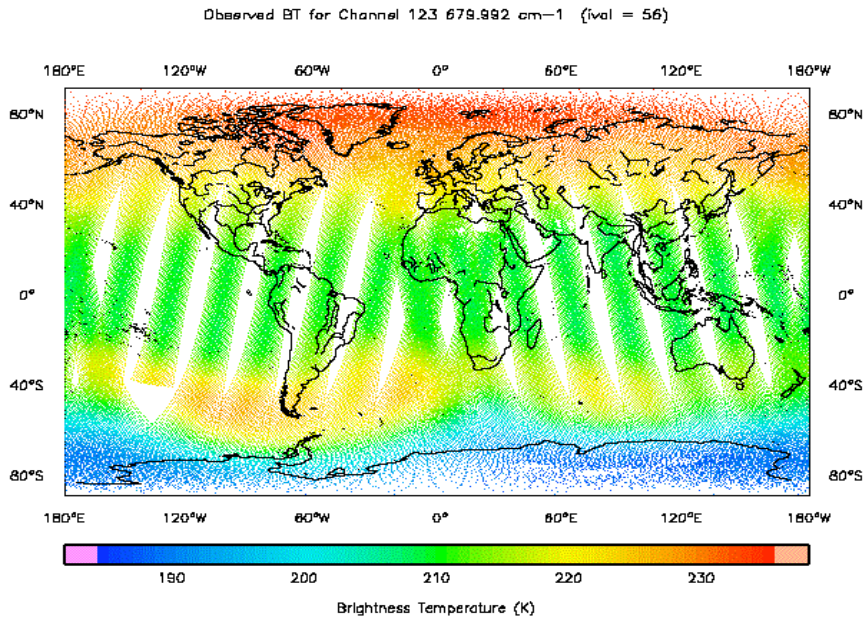
AIRS Monitoring Plots

These plots are considered experimental. The Met Office accepts no responsibility for actions taken on the basis of these monitoring plots.

Current: 57 First: 0 Last: 338

Plot Type: Map of Raw BT Skip to:

Map of Raw BT



www.metoffice.com

Monitoring web page

Available to the AIRS team in mid-December via password protected page on Met Office site.

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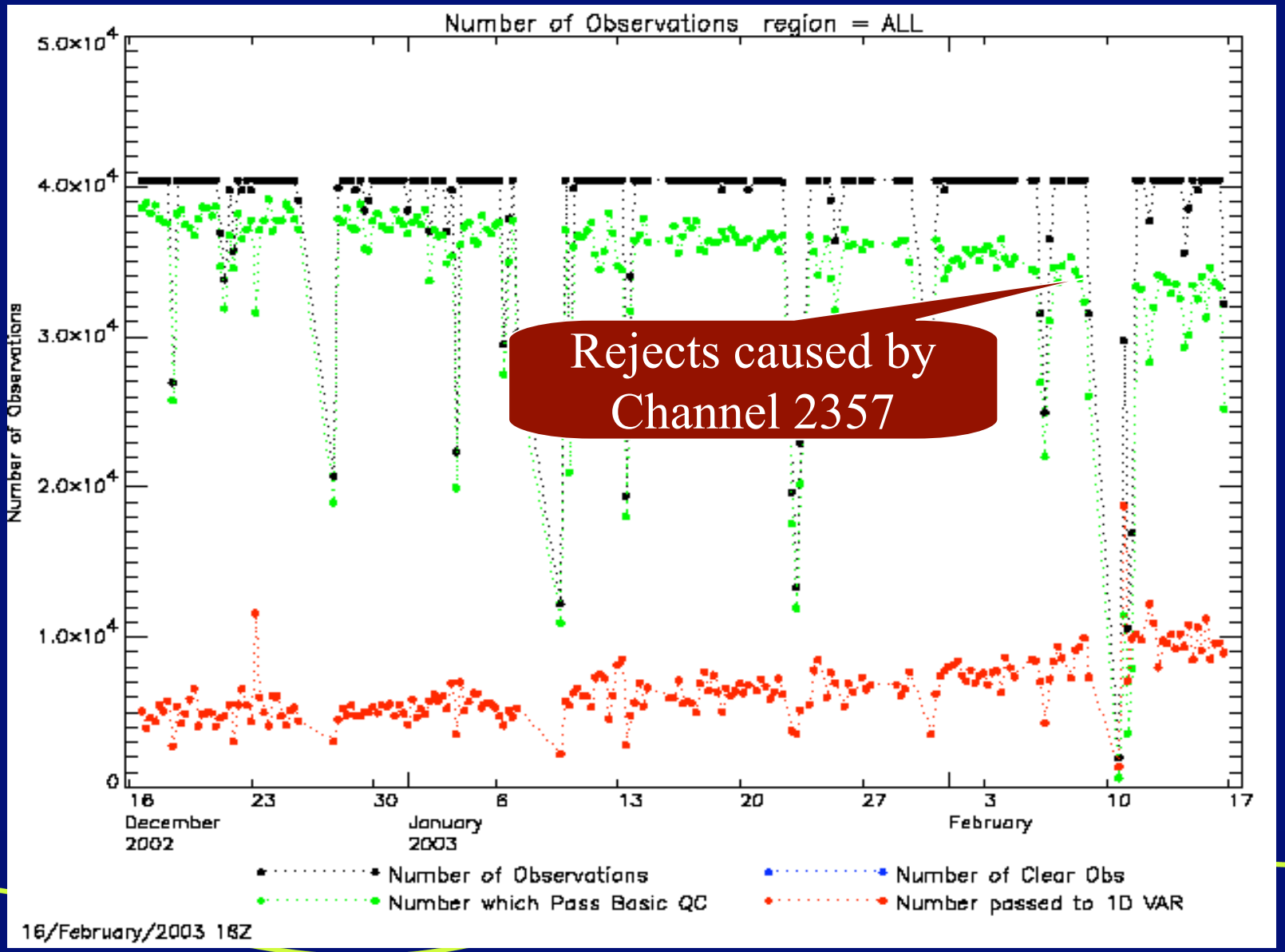
Time series of observations



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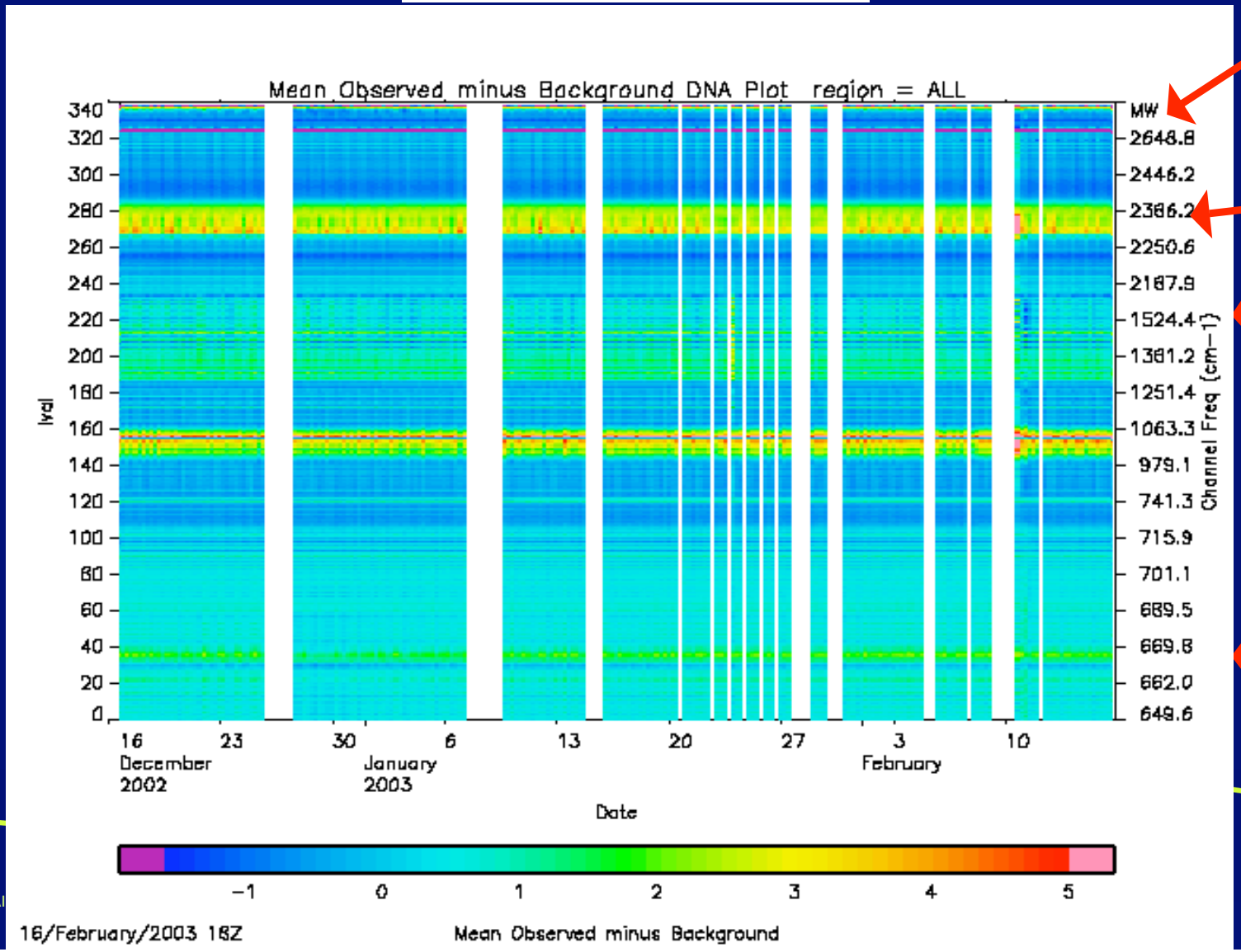
Tartan Plots: O-B clear mean bias

Global Observations



AMSU 1&2

CO_2

H_2O

O_3

CO_2

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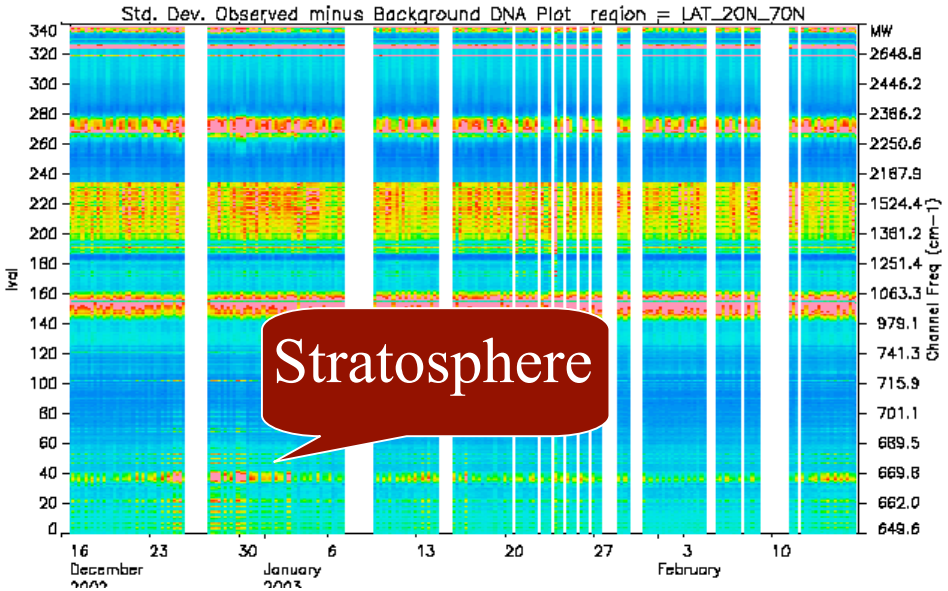
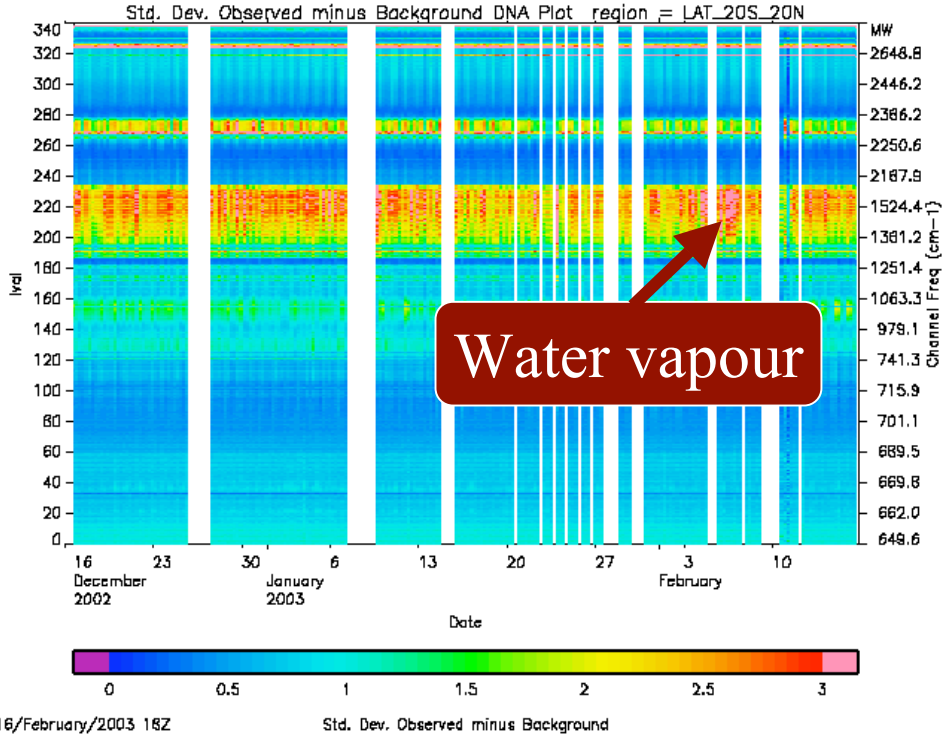


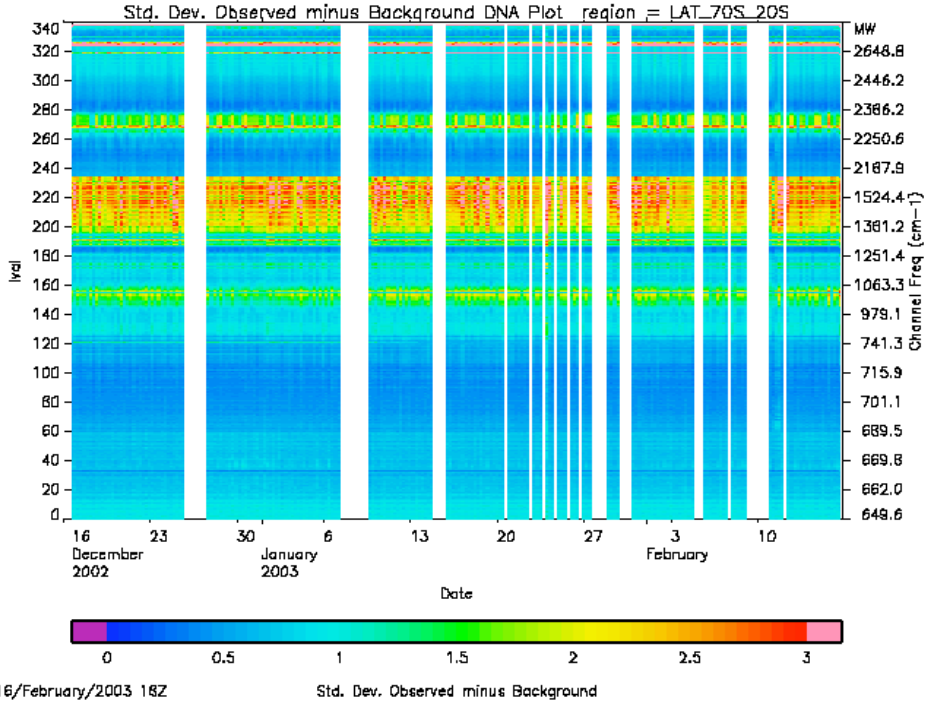
20-70N

O-B st. dev plots

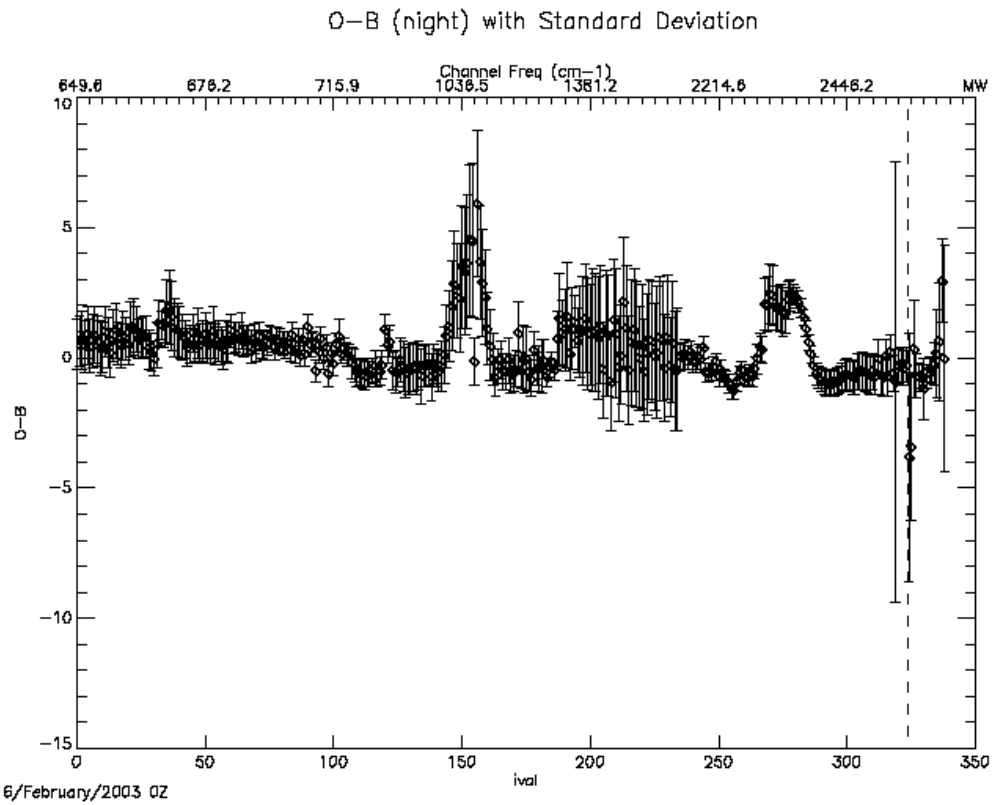
20N-20S

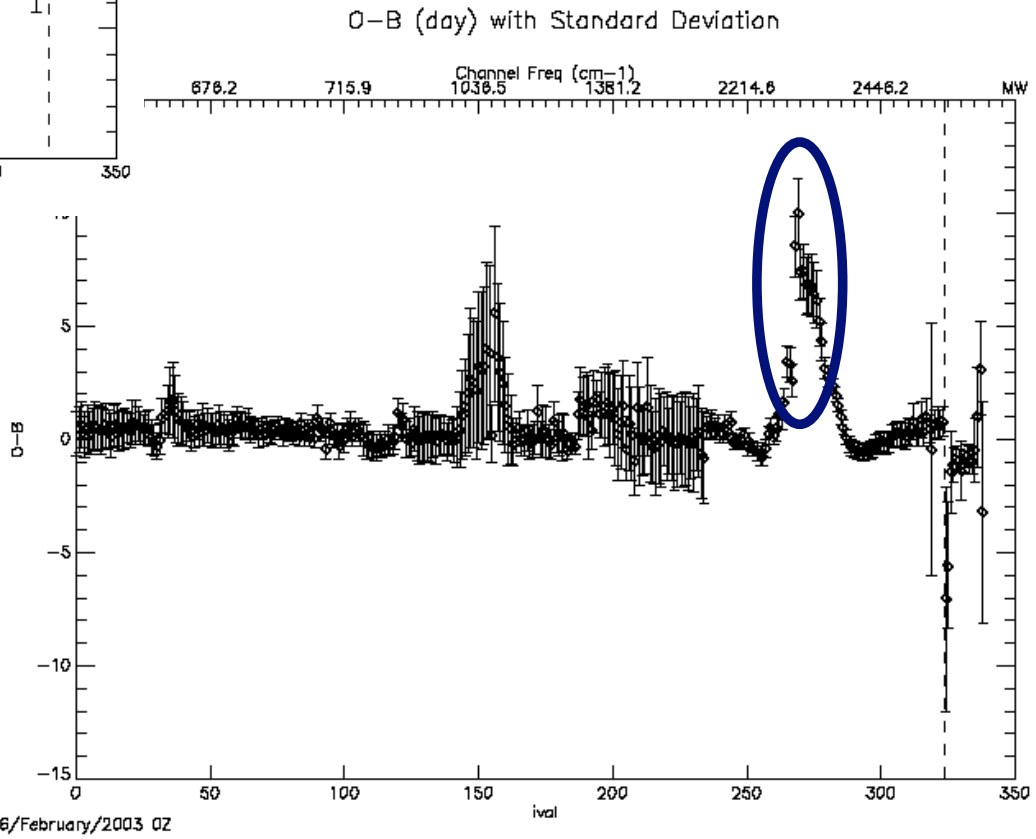
20-70S





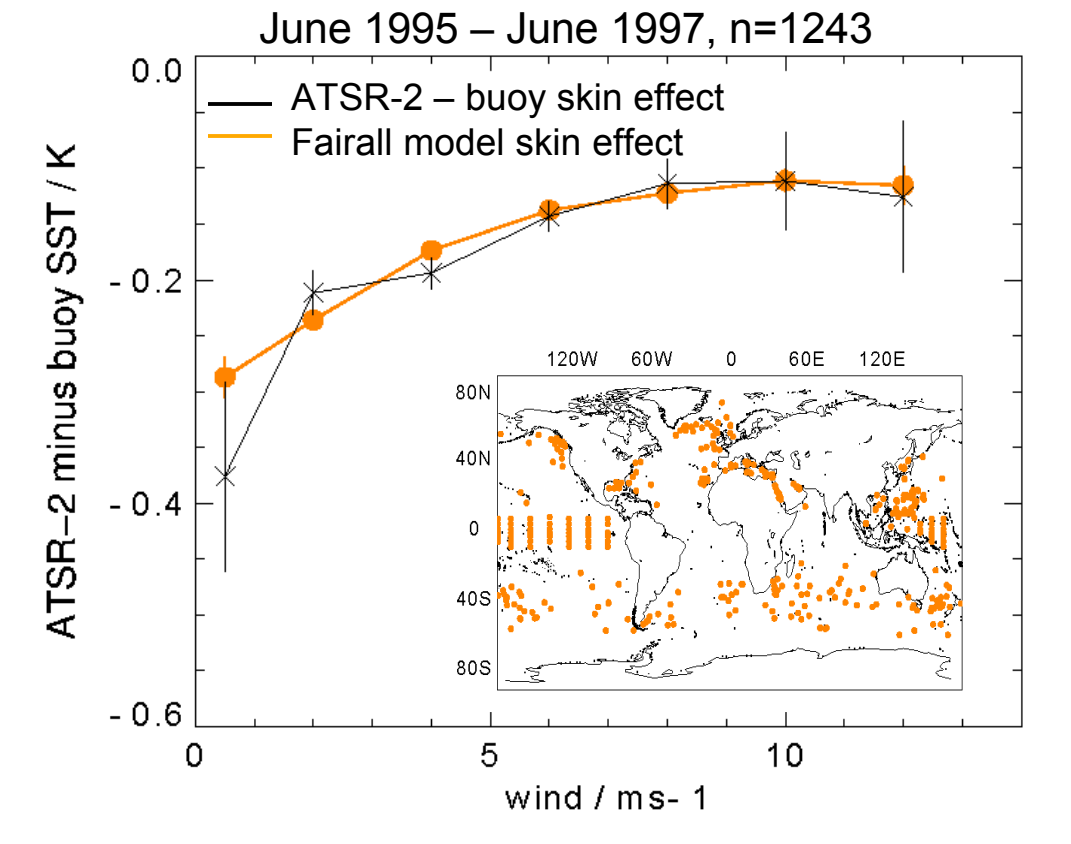
Day & Night spectra





Ocean skin to bulk temperature model validation with ATSR

- Night time satellite/buoy matchups
- Spatial match to within 1/6 degree/temporal match within 1 hour
- Fairall model for skin effect
- Can “convert” satellite skin SST to bulk using model!



Horrocks et al., JGR, *in press*

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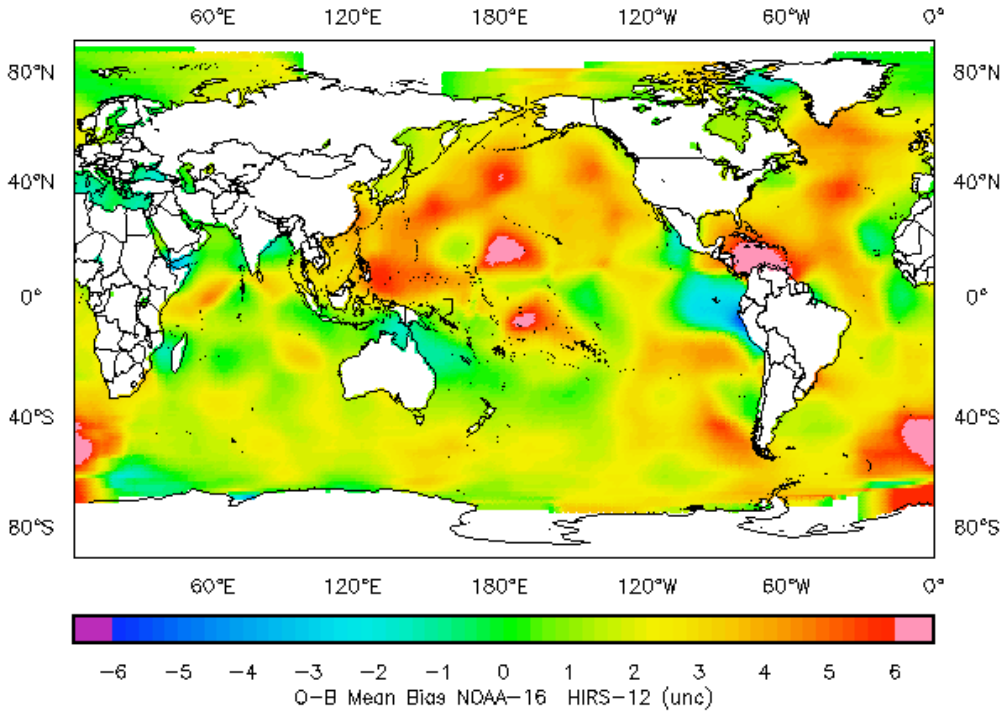
Bias tuning for AIRS

Predictors being investigated

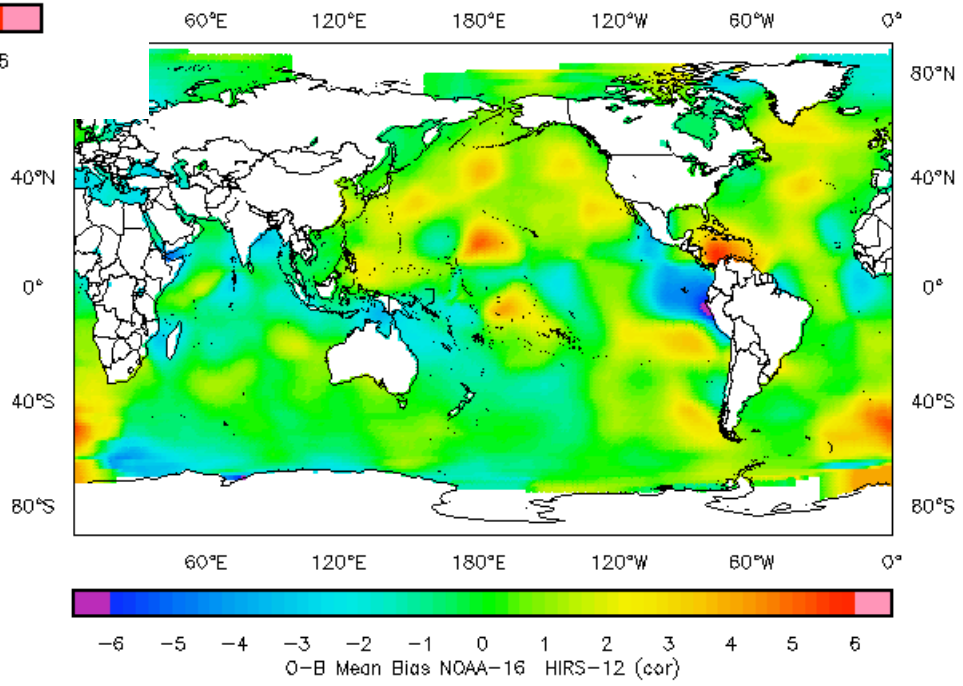
- Scan angle
- Model T_{skin}
- Model Thickness 850-300 hPa
- Model Thickness 200-50 hPa
- Simulated brightness temperature
- Model total column water
- Model Lapse rate convolved with Jacobian

Example of HIRS-12 bias tuning

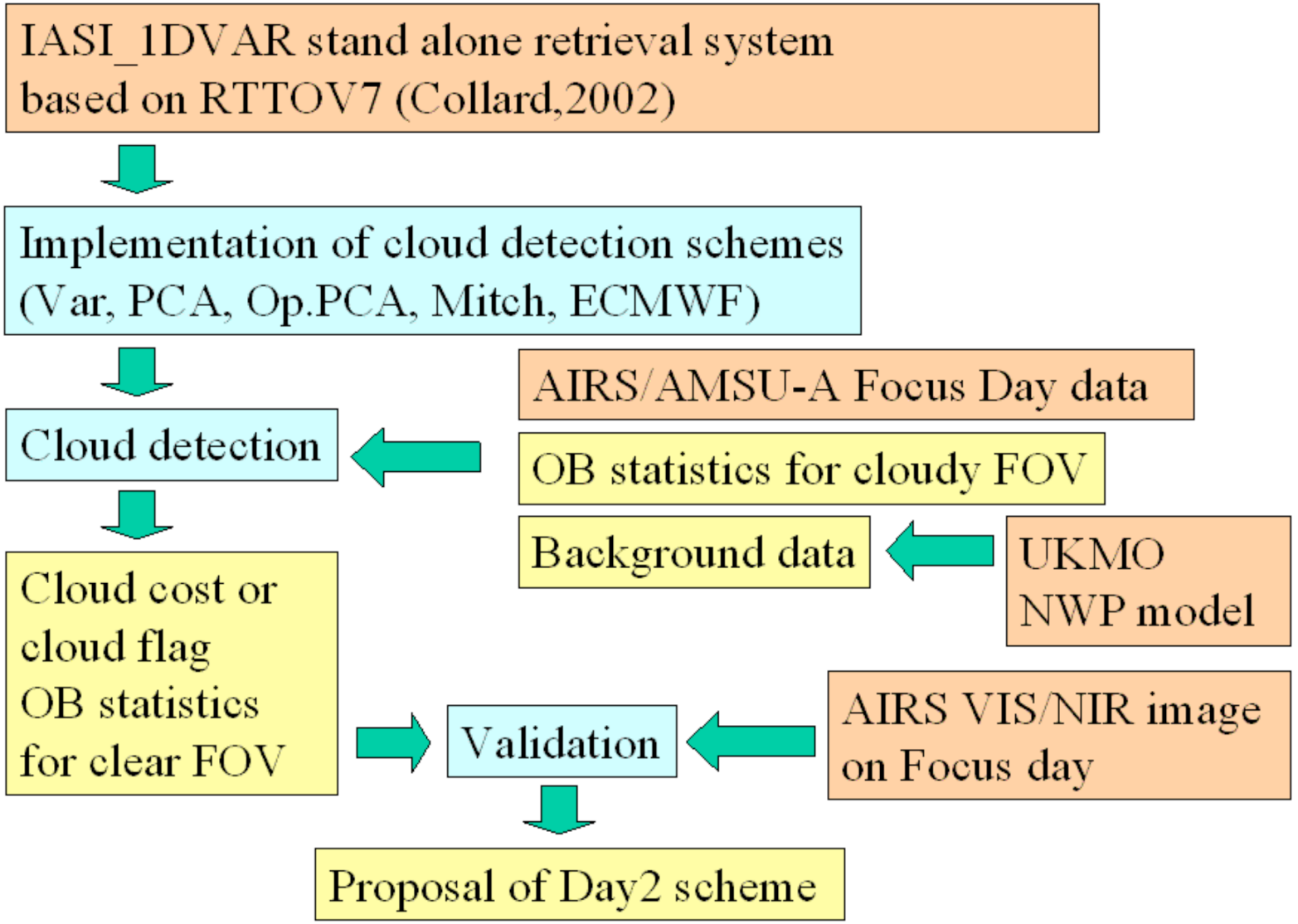
Corrected biases



Uncorrected biases



Cloud detection methodology



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PCA cloud detection

Attempt to determine the probability of having cloud in the field of view given the observed radiances and the NWP background profile

$$J = (\Delta y)^T \mathbf{S}^{-1} (\Delta y)$$

$$= (\Delta y)^T U X^{-1} U^{-1} (\Delta y)$$

$\sqrt{}$ is the ith component of Δy

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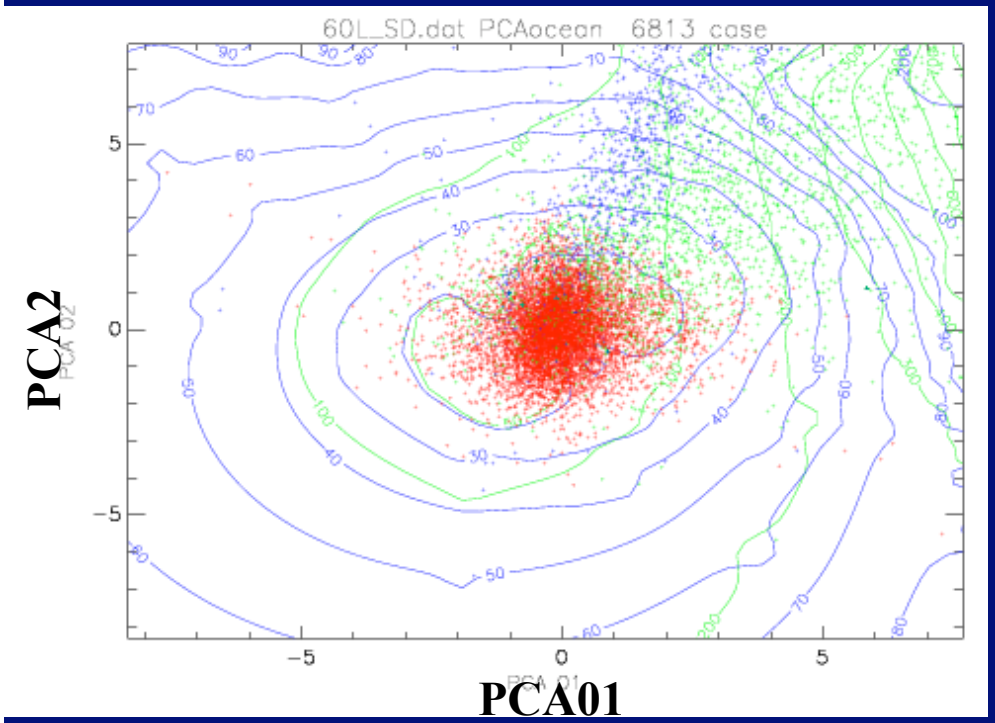
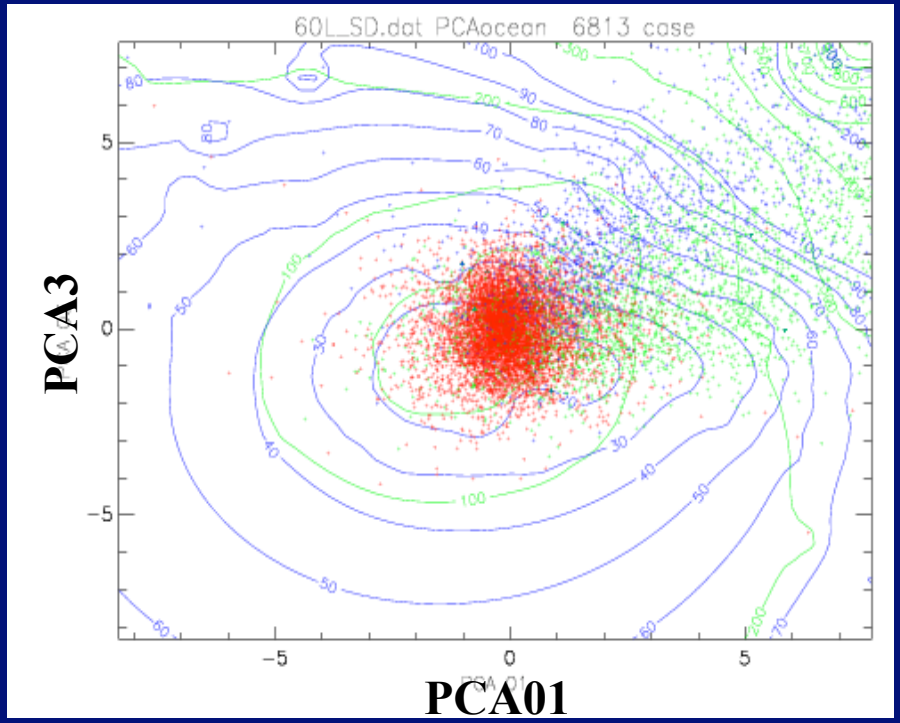
Cloud detection: Results from simulated dataset





Red is clear
Green is liquid water cloud
Blue is ice cloud

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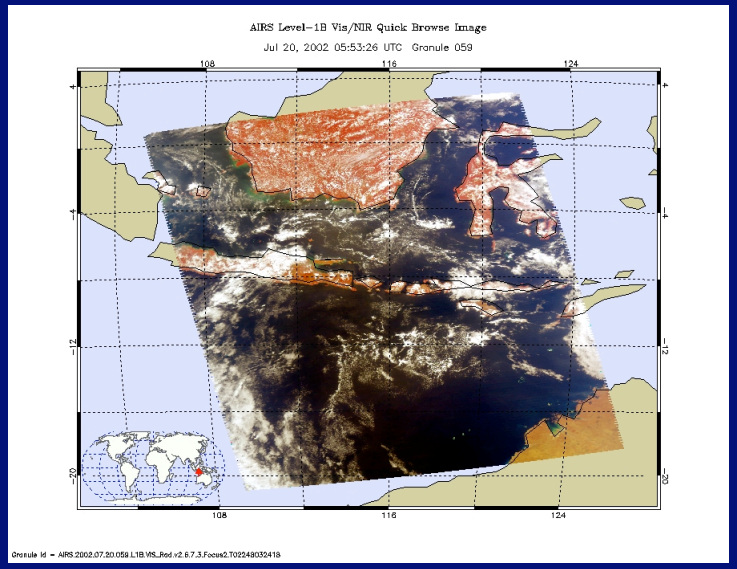
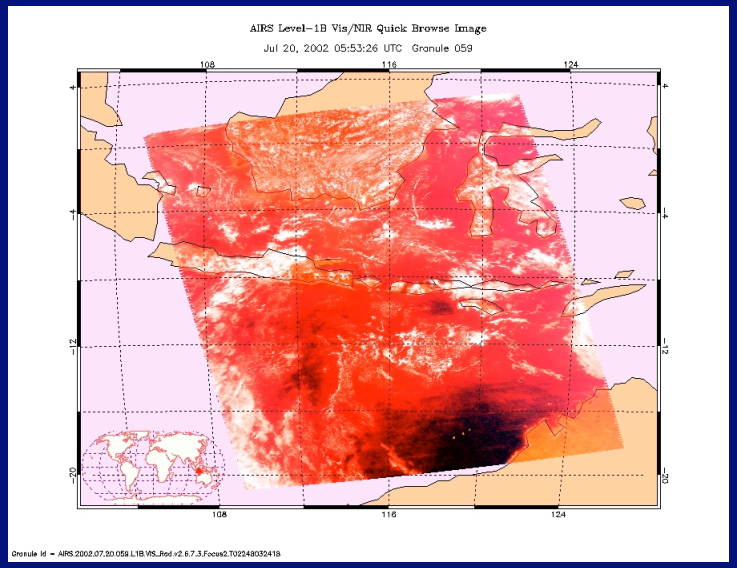
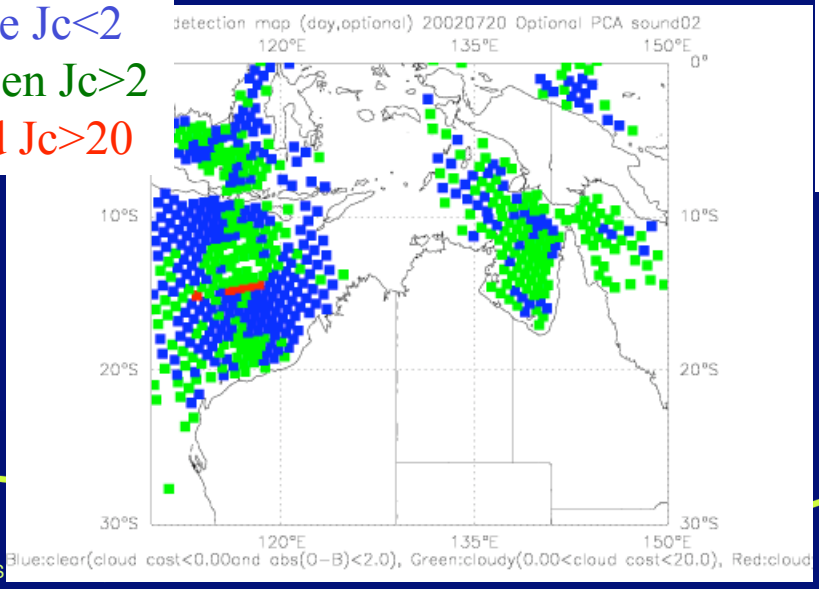
Cloud detection: Validation





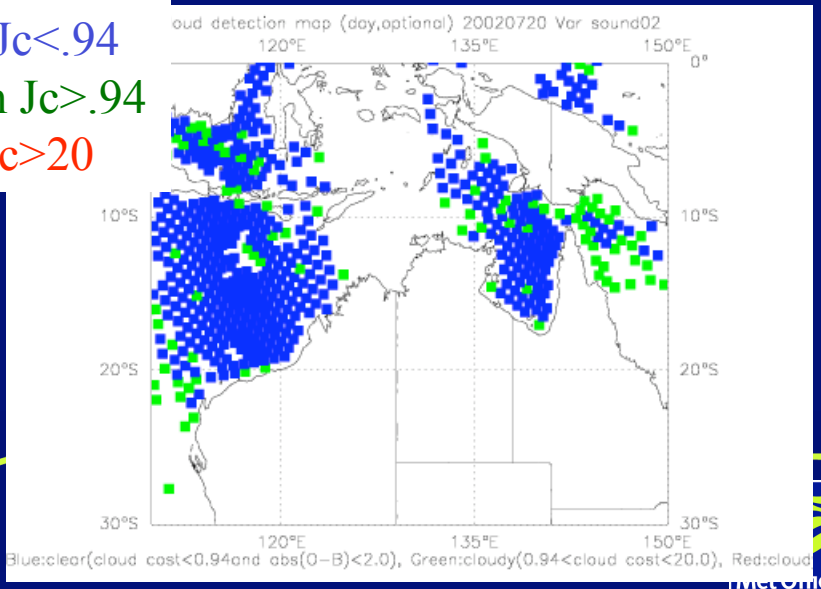
PCA scheme

Blue Jc<2
Green Jc>2
Red Jc>20



VAR scheme

Blue Jc<.94
Green Jc>.94
Red Jc>20



Assimilation trials

- Once initial bias tuning has been finalised will start assimilation trials in March (as planned).
- Period will be October-November 2002, several poorly forecast and well forecast storms during this period.
- Control will be current operations which includes:
  - ATOVS (HIRS/AMSU-A/AMSU-B)
  - SeaWinds
  - SSM/I winds
- Plan to report on results of trials by August 03
- Met Office relocation will delay possible operational use of AIRS until 2004

Summary

- AIRS continues to perform well and O-B stats are stable and as expected. See web pages.
- Cloud detection (clear FOV) schemes using VAR+PCA investigated. VAR scheme used for initial trials.
- Radiance bias correction is being implemented
- We hope to begin assimilation trials in March.